TAXONOMIC AND NOMENCLATURAL NOTES ON *HOUSTONIA NIGRICANS* (RUBIACEAE)[1]

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ABSTRACT

Herbarium and field studies on Florida and Texas representatives of *Houstonia nigricans* sens. lar. resulted in the recognition of three varieties in Florida: var. *nigricans*, var. *floridana*, and var. *pulvinata*. Taxonomic and nomenclatural confusion surrounding the name *H. filifolia* and its parent combinations are discussed, and these names and the Texas taxa *H. salina* and *H. tenuis* are relegated to synonymy under var. *nigricans*. A key to Florida varieties and a nomenclatural summary are provided.

INTRODUCTION

Houstonia nigricans (Lamarck) Fernald is a perennial, tap-rooted, polymorphic species occurring from southern Michigan to southern Florida and the Bahamas, west to eastern Colorado and Arizona, and south through northern Mexico. Over this wide range it grows in a great variety of habitats, including prairies and plains in the central United States, shale outcrops in southern Ohio, cedar glades in Tennessee, and sandy sea coasts in Florida. These notes deal with varieties and so-called species from Florida and Texas related to *H. nigricans* and conclude that var. *nigricans*, var. *floridana*, and var. *pulvinata* should be recognized in Florida. *Houstonia filifolia* and its parent combinations are relegated to synonymy under var. *nigricans*, as are also *H. salina* and *H. tenuis*.

Terrell (1975) discussed generic delimitations and pointed out the distinctness of the type species of *Hedyotis*, *Houstonia*, and *Oldenlandia* and their heterogeneity if all included under *Hedyotis*. Furthermore, recent research (Terrell et al. 1986) shows that *Houstonia* itself in North America includes several distinct groups of species based on seed and pollen morphology and chromosome number. The present paper deals with *Houstonia*, which is restricted to North America, while *Hedyotis* has an Asian type and is centered in Asia.

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MATERIALS AND METHODS

Herbarium and field studies were carried out on *Houstonia nigricans* sens. lat. using standard taxonomic methods and emphasizing morphological, chromosomal, ecological, and geographical data. Taxa described from Florida and Texas were the main objects of study. Specimens examined to compile the data appearing in the tables were lent from herbaria at FSU and US. Other specimens came from the herbaria cited in the nomenclatural summary. Additional Florida collections were recorded during visits to FLAS and USE Field observations and collections in Florida were accomplished in 1965 and 1980. Samples of the handwriting of A. W. Chapman were accessed at NA.

RESULTS AND DISCUSSION

HOUSTONIA FLORIDANA

In 1918 Standley described *H. floridana* from the vicinity of Miami, Florida (see nomenclatural summary below). The protologue and type specimens clearly apply to a group of populations that differ from typical *H. nigricans* primarily in having globose or subglobose instead of turbinate or oblong capsules. These populations are restricted almost entirely to oolitic limestone outcrops and soil over limestone in open places and rocky pinelands in Dade County from the Miami area south to Everglades National Park, in Monroe County on Big Pine Key and Key West in Florida (Fig. 1), and in the Bahama Islands (Abaco and Grand Bahama Islands). The name here adopted for these populations is var. *floridana*. In contrast, *Houstonia nigricans* var. *nigricans* occurs in Florida in coastal sands along the Gulf coast from Collier County north to Pinellas and Levy counties, in these and other habitats in several northwest counties, and in Palm Beach and Osceola counties (Fig. 1). Variety *nigricans* and var. *floridana* are allopatric.

Comparison of the more important morphological characters in ten samples of var. *floridana* and seven of var. *nigricans* from the southern one-half of Florida shows some overlap except in the capsule character (Table 1). Capsules in var. *floridana* are always globose or subglobose (superficially suggesting a relationship to the *H. purpurea* group), whereas var. *nigricans* has turbinate or oblong capsules. Variety *floridana* always has filiform leaves, but var. *nigricans* leaves vary from filiform to somewhat wider. There appear to be clines in var. *nigricans*: plants from northern Florida tend to have wider leaves, taller stems, and longer capsules; thus, southern Florida populations of var. *nigricans* are more like var. *floridana* than are northern Florida populations.

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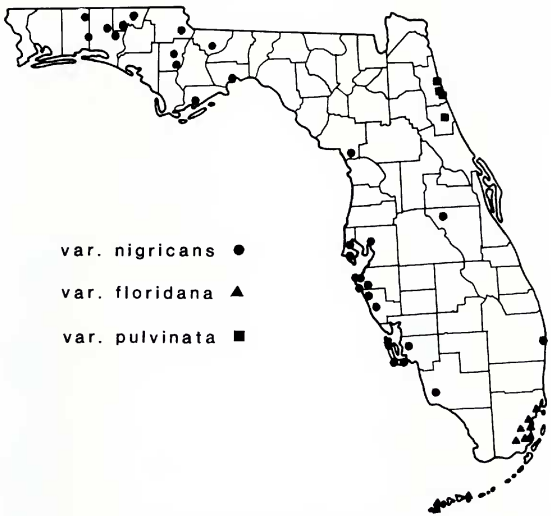

Figure 1. Distribution in Florida of three varieties of *Houstonia nigricans*; Bahama occurrences of var. *floridana* not shown.

Subglobose capsules and other parts of plants of var. *floridana* from the Bahamas were illustrated by Correll and Correll (1982) under the name *Hedyotis nigricans* var. *filifolia*.

Seed characters are very important to differentiate among species in *Houstonia*. Seeds of the two varieties of *H. nigricans* differ only in size. Seeds of three collections of var. *floridana* were $0.45-0.75$ mm long and $0.3-0.45$ mm wide compared to $0.45-1.15$ mm long and $0.3-0.6$ mm wide for var. *nigricans* for collections from Mexico and United States.

Chromosome counts for var. *nigricans* are $n=9$ and 10 (Lewis 1959, 1962). The chromosome number for var. *floridana is* $n=9$ for two Dade County collections (Lewis 1962, reported as *Hedyotis nigricans* var. *filifolia*). To these may be added another recently published count of $n=9$ (Terrell et al. 1986).

HOUSTONIA FILIFOLIA

The epithet, *filifolia*, has been used in both varietal and specific combinations to refer to south Florida specimens of *H. nigricans* with filiform leaves (see synonymy for var. *nigricans*). The epithet began with Chapman (1860) who described *Oldenlandia angustifolia* var. *filifolia*. The protologue includes the phrase, "Flowers and capsules very small." This could refer to var. *floridana* which tends to have small flowers and capsules, but so also do some plants of var. *nigricans* from south Florida. Chapman's protologue also mentions obcordate capsules rather longer than the calyx teeth. This and other phrases do not differentiate var. *filifolia* from var. *nigricans*, especially as Chapman did not mention the hallmark character of the Dade County-Monroe County populations (var. *floridana*)—the globose or subglobose capsules. The second and third editions of Chapman's flora repeat the protologue of the first (1860) edition. In the third edition, however, Chapman (1897) changed the name to *Houstonia angustifolia* var. *filifolia*, following Gray (1884).

Chapman did not designate a type specimen. To determine whether there are any extant collections by Chapman which might typify var. filifolia, I contacted or visited a number of herbaria, including most of those mentioned by Stafleu and Cowan (1976) as having Chapman collections: AUA, BM, E, GH, K, MO, NA, NY, OXF, PH, US. Results were negative from all but two of these herbaria. The GH has one collection which is discussed below. The US has three collections bearing Chapman's handwriting (verified by comparison with specimens of Chapman's handwriting on file at the National Arboretum) and variously labelled *Oldenlandia angustifolia*, *Oldenlandia angustifolia* var. *filifolia*, and *Houstonia angustifolia* var. *filifolia*. These three specimens are included in Table 1 for the purposes of comparison with other collections of both varieties. All three of the collecions fit var. *nigricans* rather than var. *floridana*, as they have longer, more turbinate capsules with length-width ratios of 1.3 to 1.9. One of the three collections, US 83375, labelled as *Oldenlandia angustifolia* var. *filifolia* from "S. Florida," is here chosen as the lectotype of var. *filifolia* (see synonymy below).

Consideration of Chapman's (1860) protologue and his available collections suggests, therefore, that var. *filifolia* applies to filiform-leaved southern Florida populations of var. *nigricans* and perhaps also to var. *floridana*, indiscriminately; i.e., Chapman did not distinguish the Dade Co.-Monroe Co. populations (var. *floridana*) as being distinct from other southern Florida populations.

Subsequently, two other authors made new combinations using the epi-

Table 1. Comparison of some Florida collections of var. *nigricans*, var. *floridana*, and Chapman collections (var. *nigricans*).

	var. NIGRICANS	var. FLORIDANA	CHAPMAN COLLECTIONS: var. NIGRICANS		
	n = 7	n = 10	US 83375	US1390549	US 956984
Height (cm)	17 – 53	12 – 35	30	--	15 – 35
Leaf width (mm)	0.5 – 2(-5)	0.5 – 1.2	0.5 – 1.2	0.5 – 1	0.4 – 1.3
Corolla length (mm)	3 – 7	3 – 5	4 – 8	4.8(one)	4 – 7
vestiture	pubescent to densely hirsutulous	glabrate to densely pubescent	densely pubescent	densely pubescent	densely pubescent
Anther length (mm)	1.0 – 1.5	0.8 – 1.2	--	--	0.9 – 1.2
Capsule length (mm)	1.7 – 3.2	1.2 – 2.5	2.0 – 2.8	2.1 – 3.2	1.9 – 3.0
width (mm)	1.3 – 2.0	1.2 – 2.2	1.2 – 1.8	1.3 – 2.2	1.0 – 1.7
L/W	1.2 – 2.2	1 – 1.3	1.3 – 1.75	1.3 – 1.7	1.5 – 1.9
shape	turbinate or oblong	subglobose or globose	turbinate	turbinate	turbinate

thet *filifolia*. Gray (1884) in his Synoptic Flora of North America cited Chapman's name and transferred it as *Houstonia angustifolia* var. *filifolia*. His description does not mention the subglobose capsules of var. *floridana*, thus could refer to either var. *floridana* or var. *nigricans*, although he mentions "Rocky pine barrens near the coast, Florida," suggesting the habitat of var. *floridana*. The GH has on file a designated "type specimen" which matches var. *floridana*. The collection is labelled as *Houstonia angustifolia* var. *filifolia* and "Syn. Fl. N. Amer.," "Blodgett," and "Key West." None of the labelling is in Chapman's handwriting. Key West probably supported var. *floridana* at one time, although I have not seen any other collections from there. "Blodgett" must refer to John Loomis Blodgett (1809 – 1853), born in Massachusetts. He went to Key West in 1838 and while there sent specimens to Torrey and Nuttall. This particular specimen may indicate Gray's idea of var. *filifolia*, but has no connection with Chapman nor any validity as a type specimen of Chapman's name.

Later, Small (1903) raised var. *filifolia* to the rank of species, but incorrectly cited Gray instead of Chapman. Small's description fits var. *floridana* by recognizing the subglobose or globose capsules. The combinations by Gray and Small are discussed above to present a complete record of the nomenclature, but do not alter the facts that the var. *filifolia* originated with Chapman (1860) and the application of the name depends on Chapman's protologue and type. Furthermore, adherence to the present nomenclature code does not allow the citation of "Chapman ex Gray," as Chapman provided a full description.

Standley (1918) in describing *H. floridana* dealt with the vars. *filifolia* of Chapman and Gray by relegating them to synonymy under *Houstonia angustifolia* (it was not until 1940 that Fernald showed that the name *H. nigricans* must supplant *H. angustifolia*). Standley listed Small's name, *H. filifolia*, as a synonym of *H. floridana* as to the description only. Thus, Standley reached essentially the same conclusions expressed here.

HOUSTONIA PULVINATA

Small (1899) described *Houstonia pulvinata* from St. Augustine, Florida, based on collections by Mary C. Reynolds and A. P. Garber (see nomenclatural summary). He believed that the short leaves, congested cymes, smaller corollas, and shorter, more obovoid capsules of *H. pulvinata* were "sufficient to warrant its treatment as a species." Fosberg (1954), however, merely listed *H. pulvinata* as a variety of *Hedyotis nigricans*.

In addition to the type specimens six collections of *Houstonia pulvinata*

have been examined from several herbaria (cited below). *Houstonia pulvinata* is now known only from St. Johns and Flagler counties in northeast Florida along the Atlantic coast (Fig. 1). The usual habitats are beaches, in sand, and more recent collections prior to 1984 mention sea shells and coquina rock. Because of the rapid expansion of building along the ocean front, there is some question whether *H. pulvinata* should be considered threatened or endangered; however, at present there are not definitive data concerning its abundance.

A 1984 collection of *H. pulvinata* by K. J. Wurdack has provided the first chromosome count and new information on its habitat. The locality for the collection was in southernmost St. Johns County in a vacant lot between two houses in a developing beach front community, where plants grew in sand among a dense mass of coquina shells about 100 feet from the ocean. Wurdack searched unsuccessfully for *H. pulvinata* at the Bunnell locality (cited below) in Flagler County, but he did not search for it elsewhere in St. Johns County. Without a complete survey it is uncertain whether *H. pulvinata* always occurs with coquina shells, thus the role of a possibly physiologically stressful habitat is not known.

To judge *H. pulvinata* more objectively, ten geographically scattered Florida collections (from herbarium FSU) of *H. nigricans* were compared with the isotype, lectoparatype, and the four recent cited collections of *H. pulvinata*. The results (Table 2) show that *H. pulvinata* differs mainly in having a consistently subprostrate habit (described as cushion-like masses), shortened internodes and pedicels, and congested inflorescences. Other differences, including corolla size and capsule shape and size, overlap greatly with var. *nigricans*.

Walter H. Lewis obtained a chromosome count of $n = 10$ for var. *pulvinata* from buds collected as part of *Wurdack 106* (Terrell et al. 1986). Generally, *H. nigricans* var. *nigricans* is known (Lewis 1959, 1962) on the basis of several counts to have both $n = 9$ and 10; however, the $n = 10$ counts came from plants in Brewster Co., Texas, and Nuevo Leon, Mexico. The $n = 9$ plants came from New Mexico, Texas, and Mexico. In addition, *H. nigricans* var. *floridana* has $n = 9$. There are no counts of *H. nigricans* var. *nigricans* from Florida plants; consequently we do not know whether there are $n = 10$ plants elsewhere in Florida.

Considering the polymorphic nature of *H. nigricans* sens. lat., it seems best to recognize *H. pulvinata* on the varietal level. Its morphological differences are consistent but mainly in vegetative characters. It is allopatric (Fig. 1). The importance of the $n = 10$ chromosome number cannot be evaluated without chromosomal data on *H. nigricans* var. *nigricans* in Florida.

TABLE 2. Comparison of 10 Florida collections of var. *nigricans* and 6 of var. *pulvinata* (see text).

	VAR. NIGRICANS	VAR. PULVINATA
Height or dia. (cm)	18–54	8–26
Habit	erect or decumbent	cushion-like masses
Internode length (mm)	6–46	2–20
Leaf length (mm)	5–32	5–15
width (mm)	0.3–2.4	0.4–2.1
Inflor. congested	somewhat to very	very
Pedicel length (mm)	0–3	0–1.5
Corolla length (mm)	4–7.5	3.5–6.5
color	purplish or pinkish to white	pink to white
Capsule length (mm)	2.0–3.0	2.0–3.0
width (mm)	1.3–2.2	1.5–2.2
L/W ratio	1.25–1.9	1.1–1.6
shape	oblong to turbinate, sometimes broadly ellipsoid	oblong to turbinate or obovoid

HOUSTONIA SALINA and H. TENUIS

Houstonia salina A. A. Heller appears to be possibly an ecological equivalent of var. *pulvinata*, as it occurs on beaches along the Gulf coast of Texas. The type collection has linear-oblong leaves and somewhat congested internodes, but otherwise falls within the limits of var. *nigricans*. There are a number of other collections from the Gulf coast of Texas including at least one from or near the type locality. Some of these collections are smaller and more congested, but others are very similar to var. *nigricans* from Texas and elsewhere. Generally, *H. salina* is variable and does not seem sufficiently distinct from var. *nigricans* to warrant recognition. There is a chromosome count of $n = 9$ reported for *Hedyotis nigricans* f. *salina* (Lewis, 1962). Later, Lewis (1970) merely listed *Houstonia salina* as a synonym of *Hedyotis nigricans*.

Houstonia tenuis Small was described from east central Texas. The leaves are more filiform than most Texas populations of *H. nigricans*. Although *H. tenuis* somewhat resembles *H. nigricans* var. *floridana*, the capsules in the protologue and type specimen are distinctly longer than wide, which places it in var. *nigricans*. Standley (1918) listed *H. tenuis*, *H. pulvinata*, and *H. salina* all as synonyms of *H. angustifolia* (*H. nigricans*).

A key to the three varieties and a nomenclatural summary of var. *nigricans* are provided below. Following these is an appendix of specimens examined for Tables 1 and 2.

ABBREVIATED KEY TO FLORIDA VARIETIES OF H. NIGRICANS

A. Stem internodes short, 2 – 20 mm long; inflorescence congested; plants in mats ..... var. *pulvinata*

AA. Stem internodes usually 6 – 46 mm long (or sometimes longer); inflorescence open or at least not congested; plants not matted.

B. Mature capsules subglobose, 1.0 – 1.3 times longer than wide .... var. *floridana*

BB. Mature capsules turbinate, oblong, or broadly ellipsoid, 1.3 – 2.2 times longer than wide (Florida plants only) ..... var. *nigricans*

NOMENCLATURAL SUMMARY

1. HOUSTONIA NIGRICANS (Lamarck) Fernald var. NIGRICANS, Rhodora 42:299. 1940. *Gentiana nigricans* Lamarck, Encycl. 2:645. 1788. TYPE: Herb. Jussieu (HOLOTYPE: P; PHOTO: FERNALD 1940). *Hedyotis nigricans* (Lamarck) Fosberg, Lloydia 4:287. 1941.

Partial synonymy follows:

Houstonia angustifolia Michaux, Fl. Bor. Amer. 1:85. 1803. TYPE: "submaritimis Floridae" (HOLOTYPE: P?). *Oldenlandia angustifolia* (Michaux) A. Gray, Pl. Wright. 2:68. 1853. *Chamisme angustifolia* (Michaux) Nieuwl., Amer. Midl. Naturalist 4:92. 1915.

Oldenlandia angustifolia var. *filifolia* Chapman, Fl. S. U.S. 181. 1860. TYPE: "S. Florida," *Chapman s.n.* (LECTOTYPE: US-83375). Lectotype here designated. *Houstonia angustifolia* var. *filifolia* (Chapman) A. Gray, Syn. Fl. N. Am. 1(2):27. 1884. *Houstonia filifolia* (Chapman) Small, Fl. S.E. U.S. 1109, 1338. 1903, as "(A. Gray) Small." *Hedyotis nigricans* var. *filifolia* (Chapman) Shinners, Field and Lab. 17:168. 1949.

Houstonia salina A. A. Heller, Contr. Herb. Franklin and Marshall Coll. 1:96, pl. 9. 1895. TYPE: TEXAS. Corpus Christi, shell deposit along beach, 31 May 1894, *A. A. Heller 1812* (LECTOTYPE: GH!; ISOTYPES: BM!, ILL!, K!, MO!, NY!, PH!, US-3!). Lectotype here designated. *Hedyotis saltna* (A.A. Heller) Shinners, Field and Lab 17:169. 1949. *Hedyotis nigricans* f. *saltna* (A.A. Heller) W.H. Lewis, Rhodora 63:222. 1961.

Houstonia tenuis Small, Fl. S.E. U.S. 1109, 1338. 1903. TYPE: TEXAS. San Saba Co.: San Saba, October 1850(?), *Thurber 67* (HOLOTYPE: NY!).

2. HOUSTONIA NIGRICANS var. FLORIDANA (Standley) Terrell, Phytologia 59:79. 1985. *Houstonia floridana* Standley, N. Amer. Fl. 32(1):36. 1918. TYPE: FLORIDA. Dade Co.: Cocoanut Grove, Biscayne Bay, Jul 1895, *A. H. Curtiss 5484* (HOLOTYPE: US!; ISOTYPES: FLAS!, NY!). *Hedyotis purpurea* var. *floridana* (Standley) Fosberg, Castanea 19:36. 1954.

3. HOUSTONIA NIGRICANS var. PULVINATA (Small) Terrell, Phytologia 59:79. 1985. *Houstonia pulvinata* Small, Bull. New York Bot. Gard. 1:289 – 290. 1899. TYPE: FLORIDA. St. Johns Co.: St. Augustine, sandy soil, Jul 1876, *Mary C. Reynolds s.n.* (LECTOTYPE: NY!; ISOTYPE: NA!). Lectoparatypes, same locality and date, *A. P. Garber s.n.* (NY!, US-2!). Lectotype here designated. *Hedyotis nigricans* var. *pulvinata* (Small) Fosberg, Castanea 19:37. 1954.